

A review of the genus *Batasio* (Teleostei: Bagridae) in Indochina, with the description of *B. tigrinus* sp. n. from Thailand

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A review of the genus *Batasio* (Teleostei: Bagridae) in Indochina, with the description of *B. tigrinus* sp. n. from Thailand. – Catfishes of the genus *Batasio* occurring in the Mae Klong, Sittang and Salween basins and in the Malay Peninsula are reviewed. Four species are recognised, *B. affinis*, *B. dayi*, *B. havmollerii* (all previously considered synonyms of *B. tengana*) and *B. tigrinus*, new species. Notes on the identity of all other nominal species of *Batasio* are provided.

Key-words: *Batasio* - Bagridae - taxonomy - Indochina.

INTRODUCTION

Species of the South and Southeast Asian catfish genus *Batasio* Blyth, 1860 are small to medium-sized bagrid catfishes with laterally compressed body found in moderate to fast-flowing streams. They possess the following synapomorphies: presence of large sensory pores on the head, a narrow mental region, presence of a pair of prominent posterior processes on the anterior part of the vomer, the entopterygoid transversely elongated and bar-like, the ectopterygoid absent and the metapterygoid in close contact with the quadrate but free from the hyomandibular (Mo, 1991).

To date, only four species of *Batasio* are regarded as valid, viz. *B. batasio* (Hamilton, 1822), *B. tengana* (Hamilton, 1822), *B. travancoria* Hora & Law, 1941, and *B. pakistanicus* Mirza & Jan, 1989. *Pimelodus chandramara* Hamilton, 1822 (with *P. rama* Hamilton, 1822 as a subjective junior synonym), previously considered to belong to a distinct genus, *Rama* Bleeker, 1858 (with *Chandramara* Jayaram, 1972 as a subjective junior synonym; Talwar & Jhingran, 1991) has been considered a species of *Batasio* by Mo (1991). Because of the very distinct differences that separate *Rama chandramara* from *Batasio* species, such as the short adipose-fin base (vs. moderately long adipose-fin base in *Batasio*; 10.2–13.5 % SL vs. 22.2–34.3) and

visible (vs. not visible) orbital margin when the head is viewed ventrally, we consider *Rama* to be a distinct genus from *Batasio* pending a more detailed study. The only taxonomic study of *Batasio* to date was conducted by Hora & Law (1941), who synonymised the following nominal species with *B. tengana*: *B. affinis* Blyth, 1860 (with *Macrones blythii* Day, 1877 as an unnecessary replacement name), *Leiocassis fluviatilis* Day, 1888, *Macrones dayi* Vinciguerra 1890, *Macrones merianiensis* Chaudhuri, 1913, and *Mystus havmolleri* Smith, 1931. *Mystus stigmaturus* Fowler, 1934, has also been considered a synonym of *B. tengana* (see Kottelat, 1989) by recent workers. While examining specimens of *Batasio* from Indochina (definition here follows that of Kottelat, 1990), it became apparent that this material, previously identified as *B. tengana*, consists of four species. This paper reviews the taxonomy of the Indochinese species of *Batasio* and provides diagnoses for these four species, one of which is described as new. Notes on the identity of the other Indian and Burmese nominal species are also provided.

MATERIAL AND METHODS

Measurements were made point to point with dial callipers and data recorded to tenths of a millimetre. Counts and measurements were made on the left side of specimens whenever possible. Subunits of the head are presented as proportions of head length (HL). Head length itself and measurements of body parts are given as proportions of standard length (SL). Measurements follow those of Ng & Kottelat (1998) and numbers in parentheses following a particular count are the numbers of examined specimens with that count.

Drawings of the specimens were made with a Nikon SMZ-10 microscopic camera lucida. The specimens examined for the present study are in Academy of Natural Sciences, Philadelphia (ANSP), Natural History Museum, London (BMNH), California Academy of Sciences (CAS), the collection of the second author (CMK), Muséum d'histoire naturelle, Genève (MHNG), Museum of Zoology, University of Michigan, Ann Arbor (UMMZ), National Museum of Natural History, Smithsonian Institution, Washington (USNM), Zoological Reference Collection, National University of Singapore (ZRC) and Zoological Survey of India, Calcutta (ZSI).

KEY TO THE INDOCHINESE SPECIES OF *BATASIO*

- 1 Adult colour pattern consisting of four dark brown vertical bars on body: one on head passing through eye, second running obliquely anterior to dorsal fin, third at anterior third of adipose fin and last on posterior extremity of caudal peduncle *B. tigrinus* sp. n.
- Adult colour pattern consisting of a dark brown predorsal oblique bar; dark brown spot on side of body below adipose fin and bar on head passing through eye present or absent 2
- 2 No dark brown spot on side of body below adipose fin; snout long (41.0–44.6 % HL): distal four-fifths of dorsal fin dark brown, with a narrow hyaline distal margin *B. dayi*

- Dark brown spot on side of body below adipose fin; snout short (31.9–41.5 % HL); distal one-third to half of the dorsal fin dark brown, with a narrow hyaline distal margin 3
- 3 Dorsal spine long (14.0 % SL); large eyes (24.4 % HL) set far apart (31.7 % HL); distal one-third of dorsal fin dark brown, with a narrow hyaline distal margin; pelvic origin in front of base of last dorsal-fin ray *B. affinis*
- Dorsal spine short (10.7–12.4 % SL); small eyes (18.2–23.5 % HL) set near each other (25.9–28.6 % HL); distal half of dorsal fin dark brown, with a narrow hyaline distal margin; pelvic origin below or slightly behind last dorsal-fin ray *B. havmolleri*

DESCRIPTIONS

Batasio affinis Blyth, 1860

Fig. 1

Batasio affinis Blyth, 1860: 150 (type locality: Myanmar: Tenasserim).

Macrones affinis: Günther, 1864: 83; Day, 1873: 111.

Macrones Blythii Day 1877: 445 (unnecessary replacement name for *Batasio affinis* Blyth, 1860).

Macrones blythii: Day 1889: 151.

? *Leiocassis fluviatilis* Day, 1888: 805 (type locality: Myanmar: Tenasserim, Anin stream, near Weywoon [15°41'N 97°48'E], Wagroo); Day, 1889: 164.

Batasio tengana (in part): Hora & Law, 1941: 36.

Mystus blythii: Menon & Yazdani, 1968: 125.

Material examined. ZSI F7880/1, holotype, 67.3 mm SL; Myanmar: “Sitang River, Tenasserim”; Berdmore, date unknown. We have also examined a photograph (deposited in the library of ZRC) of a specimen (of unknown size) collected by T. Roberts in March 1992 in the Tenasserim River basin (the current disposition of the specimen is unknown).

Diagnosis. *Batasio affinis* can be differentiated from all other congeners in having a unique combination of the following characters: a colour pattern consisting of a greyish brown body with a dark brown predorsal oblique bar and a dark brown spot on the side of the body below the adipose fin, dark brown band on distal half of dorsal fin, dorsal-spine length 14.0 % SL, body depth at anus 18.0 % SL, snout length 36.0 % HL, eye diameter 24.4 % HL, interorbital distance 31.7 % HL. Fin ray counts: dorsal I,6; pectoral I,8; pelvic i,5; anal iv,8; caudal 7/8. See Key and Discussion for further comparison with *B. havmolleri*.

Distribution. *Batasio affinis* is known only from the Tenasserim River basin and “Tenasserim Provinces” in southern Myanmar (Fig. 2). Note that the “Tenasserim Provinces” in Blyth’s (1860) original description is much larger than today’s Tanintharyi (Tenasserim) state of Myanmar. Blyth’s “Tenasserim Provinces” also seems to have included parts of the present Myanmar states of Kayah, Kayin (Karen), Mon and part of Bago (Pegu) (Fang & Kottelat, 1999).

Remarks. While Blyth’s recorded the origin of the holotype of *B. affinis* simply as “Tenasserim”, Menon & Yazdani (1968: 126) record the locality of the holotype as “Sittang R., Tenasserim”. These are also the data on the label, which obviously is not the original Blyth’s label. Hora & Law (1941) mention only Tenasserim. Blyth’s

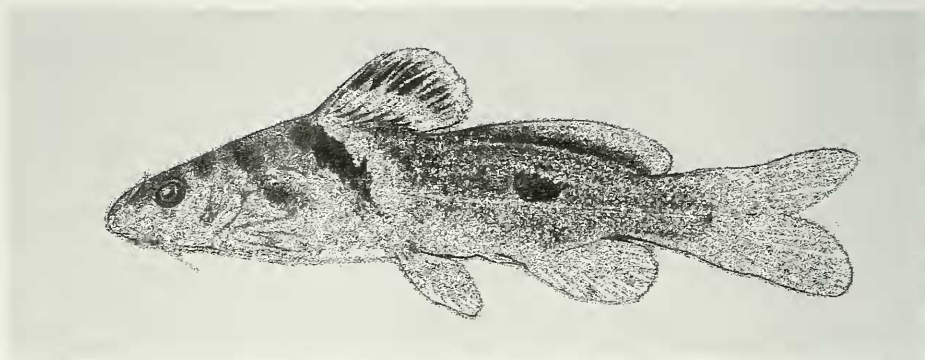


FIG. 1

Batasio affinis, after photograph of a specimen collected from Tenasserim River (drawing by Kelvin K. P. Lim).

(1860) original description of *B. affinis* is part of a paper reporting fishes obtained “chiefly from the Sitang River and its tributary streams, Tenasserim Provinces”. The introduction further says that the paper deals with “fluviatile species, mostly collected by the late Major Berdmore in the Sitang river and its tributaries, with a few notices of new or little known species from the Gangetic streams and their outlets”. We are not convinced that this statement allows to interpret that all species reported from “Tenasserim” by Blyth are ipso facto from the Sitang basin. Blyth explicitly gives the locality as Sitang for a few species (*Ambassis notatus*, *A. lala*, p. 138; *Toxotes microlepis*, p. 142; *Mastacembelus unicolor*, *M. zebrinus*, p. 144, etc.), therefore we feel that those not recorded as originating from the Sitang should be retained as from “Tenasserim”. We are not aware of recent collections from the Sitang basin which could demonstrate that all the “Tenasserim” species described by Blyth effectively are from the Sitang. Collections by the second author and others in the Salween basin in Thailand (especially the Mae Nam Moei drainage) have yielded a number of species identified as conspecific with Blyth’s species. This especially applies to many small size species known to inhabit hill streams and likely to have restricted distribution ranges (as evidenced by the distribution of their congeners in adjacent basins). If these identifications are correct, we expect that the range of some of these species may extend across the Salween to the Sitang basin, but we do not expect that this would be the case for all. Therefore, we hypothesize that part or all of Blyth’s “Tenasserim” specimens are from or south of the Salween basin. Nominal species described by Blyth from Tenasserim freshwaters and (possibly) with small ranges are: *Glyptothorax trilineatus*, *Exostoma bermorei*, *Silurichthys* [sic] *berdmorei* [*Pterocryptis bermorei*], *Barbus caudimarginatus* [*Puntius caudimarginatus*], *Prosteacanthus spectabilis* [*Acantopsis spectabilis*], *Cobitis cincticauda* [*Schistura cincticauda*], *Homaloptera* [sic] *bilineata* [*Homaloptera bilineata*]. *Batasio affinis* is not recorded from the Salween basin in Thailand (pers. obs.; Ukkatawewat & Vidthayanon, 1998); the specimen from Tenasserim River basin mentioned above and the syntypes of *Leiocassis fluviatilis* are the only specimen we are aware of since its original description.



FIG. 2

Map showing distribution of Indochinese *Batasio* species. Open symbols indicate type localities. Type locality of *B. affinis* not indicated due to imprecise information (see text).

Leiocassis fluviatilis Day (1888: 805) has been treated as a synonym of *B. tengana* by Hora & Law (1941). Its syntypes are apparently lost (Whitehead & Talwar, 1976; Eschmeyer, 1998). The original description of *L. fluviatilis* is brief and not very informative. The colour pattern given in the original description (“yellowish horny” and “a large black blotch on the lateral line above the anal fin, another between the pectoral and the first dorsal”) could refer to *B. affinis*, *B. havmolleri* or *B. merianiensis* (although the tip of the caudal lobes are described as being black, a character not seen in any of the three species). We tentatively consider *L. fluviatilis* to be a junior synonym of *B. affinis* because the two nominal species are found in the same general area (Tenasserim) and as far as is known, there appears to be only a single species of *Batasio* in this area. The type locality is also in Tenasserim: “Anin stream, near Weywoon, Wagroo” On the maps available to us (1:250,000, Series 1501S, Sheet ND 47-2, Royal Thai Survey Department, 2516 [1973]), this locality appears as Wewun [15°41'N 97°48'E]. The Anin Chaung is a small stream entering the Andaman Sea at 15°36'N 97°44'E, with its headwaters about 20 km NW in the mountain range which constitutes the southern boundary of the Ataran, the southernmost branch of the Salween.

Batasio affinis was placed in *Macrones* by Day (1875: 445), who considered it as a junior secondary homonym of *Bagrus affinis* Jerdon (1849: 338), a species which he placed in the synonymy of *M. vittatus* (p. 448). Day proposed *M. blythii* as a replacement name. But, under art. 57.3.1 of the International Code of Zoological Nomenclature, *Batasio affinis* and *Bagrus affinis* are not secondary homonyms as they have not been brought in combination with the same generic name [the key criterion is the combination of the generic and specific names and, to our knowledge, *Bagrus affinis* has never been used as *Macrones affinis*], and therefore *Macrones blythii* is an unnecessary replacement name. That the two nominal species were then considered congeneric is not relevant to the argument [art. 59.1 does not apply as it explicitly concerns secondary homonyms which have already been shown homonyms under art. 57.3.1]. And even if the two names were treated as secondary homonyms, then it seems that under art. 59.3 *B. affinis* cannot be rejected since the substitute name [*M. blythii*] is not in use. The Code does not define “in use”. We are only aware of a single usage of the name as a valid species-group name, as *Mystus blythii*, in Menon & Yazdani’s (1968: 125) ZSI type catalogue.

Batasio dayi (Vinciguerra, 1890)

Fig. 3

Macrones dayi Vinciguerra. 1890: 230, pl. 7 fig. 3 (type locality: Myanmar: Meetan).

Macrones (Macronoides) dayi: Hora. 1921: 179

Aoria (Macronoides) dayi: Prashad & Mukerji, 1929: 180; Mukerji, 1933: 818.

Batasio tengana (in part): Hora & Law. 1941: 36; Kottelat, 1989: 13; Vidhayanon *et al.*, 1997: 43.

Material examined. BMNH 1893.2.16.8, 1 ex., syntype, 56.2 mm SL; Myanmar: Meetan (=Mitan Chaung, a rivulet flowing south from the summit of Mulayet Taung, 16°11'N 98°32'E). - ZRC 46108, 3 ex., 62.6-82.7 mm SL; Myanmar: Kachin State, Myitkyina market; C. J. Ferraris, Tun Shwe & Mya Than Tun, 4-8 Nov 1997.

Diagnosis. *Batasio dayi* can be differentiated from all other congeners in having a unique combination of the following characters: colour pattern of body

consisting only in a dark brown oblique predorsal bar, distal four-fifths of the dorsal fin dark brown with a narrow hyaline distal margin, body depth at anus 19.2–20.5 % SL, snout length 41.0–44.6 % HL, interorbital distance 22.2–25.8 % HL. Fin ray counts: dorsal I,7; pectoral I,8; pelvic i,5; anal iv,8; caudal 8/9.

Distribution. *Batasio dayi* is known from the Salween and Irrawaddy River drainages in Myanmar (Fig. 2).

***Batasio havmolleri* (Smith, 1931)**

Figs 4, 5

Mystus havmolleri Smith, 1931: 24, fig. 12 (type locality: Thailand: Klong Thalerng near Ban Ron Phibun).

Mystus stigmaturus Fowler, 1934: 94, figs 41 & 42 (type locality: Thailand: Nakhon Sritammarat); Fowler, 1939: 58; Geisler *et al.*, 1979: 686.

Mystus havmolleri: Smith, 1945: 389, fig. 86; Geisler *et al.*, 1979: 686.

Batasio tengana (non Hamilton): Hora & Gupta, 1941: 23, pl. 4 fig. 7; Hora & Law, 1941: 36 (in part); Kottelat & Wirtz, 1983: 406; Kottelat, 1989: 13 (in part); Lim *et al.*, 1993: 6; Vidhayanon *et al.*, 1997: 43 (in part).

Material examined. ZRC 41973, 1 ex., 70.5 mm SL; Thailand: Ranong Province, King Amphoe Suk Sam Lan, Ton Koi waterfall; D. C. J. Yeo *et al.*, 11 August 1997. – ZRC 42188, 2 ex., 23.2–47.7 mm SL; Thailand: Ranong Province, stream N of Khuraburi, 100 km S of Ranong; M. Kottelat *et al.*, 5 November 1995. – ZRC 42204, 3 ex., 39.1–53.1 mm SL; CMK 12153, 3 ex., 34.6–72.2 mm SL; Thailand: Ranong Province, Khlong Kho Krue at Ban Kho Krue, km 3.5 on road to Nam Tok Kho Krue, branching E 3 km S of Kraburi on road to Ranong; M. Kottelat *et al.*, 6 November 1995. – CMK 5384, 1 ex., 43.7 mm SL; Thailand: Ranong Prov.: stream on road from Ranong to Kra Buri, km 37; M. Kottelat & A. Kottelat-Kloetzli, 24 April 1985. – USNM 90304, 1 ex., holotype, 38.0 mm SL; Thailand: Klong Thalerng near Ban Ron Phibun, coll. unknown, January 1927. – USNM 90305, 2 ex., paratypes, 37.5–40.7 mm SL; Thailand: Klong Thalerng; H. M. Smith, January 1927. – ANSP 59338, 1 ex., 59.0 mm SL (holotype of *M. stigmaturus*); ANSP 59339–59341, 3 ex., 53.0–57.1 mm SL (paratypes of *M. stigmaturus*); Thailand: Nakhon Sritammarat; R. M. de Schauensee, 6 May 1933. – ANSP 59342, 4 ex., 48.3–59.0; Thailand: Nakhon Sritammarat; R. M. de Schauensee, 21 May 1933. – CMK 5177, 3 ex., 55.1–60.0 mm SL; Thailand: Surat Thani Prov.: Khlong Sok at Ban Khlong Sok, Tapi River basin; S. Lumletrdacha *et al.*, 4 April 1985. – MHNG 2158.48, 29 ex., 33.8–71.2 mm SL; Thailand: Phangnga Prov.: Lam Pi, north of Phuket; R. Geisler, April 1975. – ANSP 77435, 1 ex., 62.7 mm SL; Thailand: waterfall at Trang, a 40 foot–fall of the Trang River at Chong, 12 miles E of Thap Thian or Trang; R. M. de Schauensee collectors, 13 October 1936. – CMK 12116, 1 ex., 42.0 mm SL; Thailand: Satun Prov.: stream in Ban Kong Kruat; 6°52'4"N 100°01'48"E; M. Kottelat *et al.*, 4 November 1995. – ZRC 43757, 4 ex., 25.8–64.7 mm SL; Thailand: Narathiwat Province, Bacho, Bhudo Padee National Park; H. H. Tan *et al.*, 24 October 1998. – ZRC 392, 5 ex., 46.5–71.1 mm SL; Malaysia: Terengganu, Sungai Tok Dor, 11.5 miles S of Jerreh; E. R. Alfred, 5 July 1958. – ZRC 2401, 3 ex., 51.6–64.5 mm SL; Malaysia: Perak, Chenderoh Lake; collector unknown, 1938. – ZRC 39533, 2 ex., 31.4–35.3 mm SL; Malaysia: Perak, tributary of Sungai Kulim 11 km before Gerik; H. H. Tan *et al.*, 19 November 1995. – ZRC 41062, 2 ex., 11.5–13.0 mm SL; Malaysia: Perak, Sungai Kenderong at Gerik (5°25'28.5"N 101°7'39.0"E); H. H. Ng *et al.*, 17 February 1997. – ZRC 41076, 12 ex., 13.2–21.7 mm SL; Malaysia: Perak, Sungai Lebey, ca. 16 km from Gerik on Gerik–Kota Bharu road (5°27'33.3"N 101°13'26.9"E); H. H. Ng *et al.*, 17 February 1997. – ZRC 41090, 2 ex., 15.9–22.0 mm SL; Malaysia: Kedah, Caruk Bukit Sebelah, a small rocky stream ca. 2 km before Baling on Gerik–Sungai Petani road (5°40'54.8"N 100°56'33.8"E); H. H. Ng *et al.*, 18 February 1997.

Diagnosis. *Batasio havmolleri* can be differentiated from all other congeners in having a unique combination of the following characters: body with a dark brown predorsal oblique bar and a dark brown spot on the side below the adipose fin, dorsal-



FIG. 3

Batasio dayi, ZRC 46108, 82.7 mm SL (photograph by Tan Heok Hui).



FIG. 4

Batasio havmolleri, CMK 5177, 55.1 mm SL (photograph by M. Kottelat).

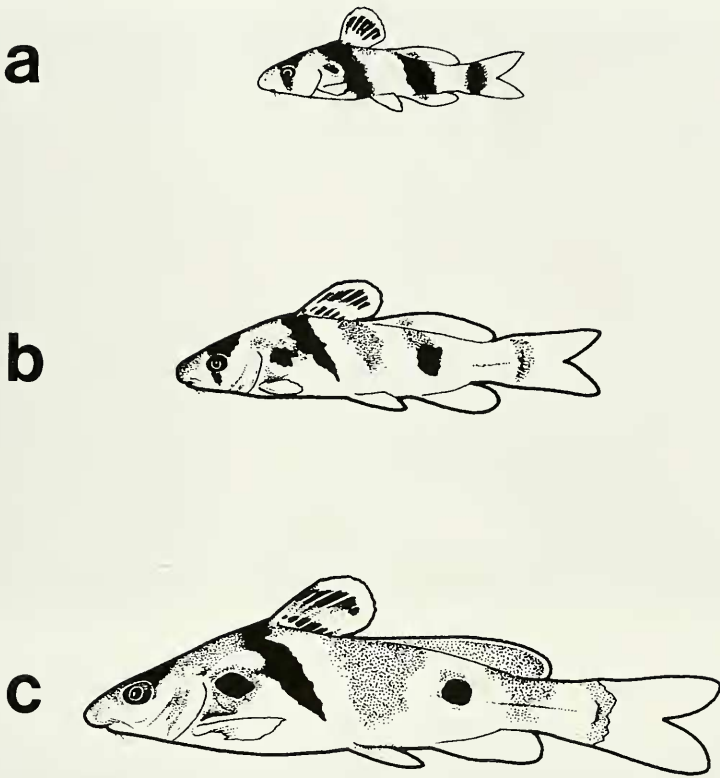


FIG. 5

Schematic illustration showing ontogenic change in colour pattern of *Batasio havmolleri*: a. ZRC 43757, 25.8 mm SL; b. ZRC 43757, 38.5 mm SL; c. ZRC 43757, 57.4 mm SL (drawing by Kelvin K. P. Lim).

spine length 10.7–12.4 % SL, length of adipose-fin base 30.0–33.3 % SL, body depth at anus 18.7–21.1 % SL, snout length 38.3–41.5 % HL, eye diameter 18.2–23.5 % HL, interorbital distance 25.9–28.6 % HL. Fin ray counts: dorsal I,7; pectoral I,8 or I,8,i; pelvic i,5; anal iv,8, iv,9 or v,9; caudal 8/9. See Key and Discussion for further comparison with *B. affinis* and *B. tigrinus*.

Distribution. *Batasio havmolleri* is known from the Malay Peninsula, south of the isthmus of Kra. It extends to the south as far as the Perak River basin on the west coast and the Terengganu River basin on the east coast. At present, it is known to extend to the north as far as the Tapi River basin on the east coast and the area of Ranong along the west coast (Fig. 2). Its distribution range may actually be more extensive towards the north but this area has not been surveyed on the Myanmar side (western slope) and very poorly on the Thai side (eastern slope). The southern end of the Malay Peninsula has been more surveyed and the presence of the species much further south is not expected.

Notes on Biology. *Batasio havmolleri* is found in rivers and streams with moderate to swift current and a predominantly rocky bottom, less frequently in slow flowing streams with a muddy substrate. The fish hide among stones or submerged vegetation during the day and come out at night to feed.

Remarks. The colour pattern of *B. havmolleri* changes with age. Newly hatched fish (ca. 3 mm) are unpigmented, but at ca. 6 mm SL, they begin to develop a colour pattern consisting of two vertical dark bars: one on the head passing through the eye and another on the dorsum just below the rudimentary dorsal fin (Kottelat & Wirtz, 1983). By the time they develop into juveniles of about 10–25 mm SL, the number of dark brown bars increases to four: one on the head passing vertically through the eye, the second running obliquely anterior to the dorsal fin, the third vertically at the anterior third of the adipose fin and the last one vertically on the posterior extremity of the caudal peduncle (Fig. 5a). The first and last bars, as well as the dorsal and ventral thirds of the third bar gradually fade with age (the bars begin to fade when the specimen is ca. 40 mm SL; Fig. 5b), leaving behind a dark brown spot below the anterior third of the adipose fin (Fig. 5c).

This ontogenetic change in coloration was noted by Smith (1945) and explains the difference in coloration between the types of *Mystus havmolleri* and *M. stigmaturus* (the types of the former species are smaller than those of the latter and represent the juvenile coloration).

Batasio tigrinus sp. n.

Fig. 6

Batasio tengana (in part): Vidthayanon *et al.*, 1997: 43.

Holotype. ZRC 40624, 62.1 mm SL; Thailand: Kanchanaburi Province, Mae Nam Khwae Noi basin, Huai Lia, km 49 on road from Thon Pha Phun to Sangkhla Buri (15°4'25"N 98°33'51"E); H. H. Tan & H. H. Ng, 28 July 1999.

Paratypes. CMK 14431, 2 ex., 49.5–52.8 mm SL; Thailand: Kanchanaburi Province, Mae Nam Khwae Noi basin, Huai Lia, km 49 on road from Thon Pha Phun to Sangkhla Buri (15°4'25"N 98°33'51"E); K. Kubota, April 1998. – CMK 14533, 9 ex., 42.9–59.7 mm SL; Thailand: Kanchanaburi Province, Mae Nam Khwae Noi basin, Huai Khayeng (Huai Pak) at Ban Huai Khayeng (14°35'14"N 98°34'56"E); M. Kottelat & K. Kubota, 3 April 1998. – CMK 14541, 1 ex., 56.1 mm SL; Thailand: Kanchanaburi Province, Mae Nam Khwae Noi basin, Nam Khung upstream of Ban Huai Pak Khung (14°38'44"N 98°31'23"E); M. Kottelat & K. Kubota, 3 April 1998. – ZRC 40623, 1 ex., 62.0 mm SL; CAS 213312, 1 ex., 59.0 mm SL; data as for holotype.

Diagnosis. *Batasio tigrinus* can be differentiated from all other congeners in having fewer vertebrae (35–37 vs. 38–41) and a unique adult colour pattern consisting of four vertical dark brown bars on a greyish brown head and body (vs. with predorsal bar and posterior spots, mottled coloration, or horizontal midlateral stripes). It can be further differentiated from its congeners in having a unique combination of the following characters: length of adipose-fin base 23.9–26.7 % SL, pectoral–spine length 10.3–12.9 % SL, dorsal–spine length 9.4–12.5 % SL, body depth at anus 18.4–20.8 % SL, snout length 31.9–36.9 % HL, and interorbital distance 29.3–31.9 % HL. See Key and Discussion for further comparison with *B. havmolleri*.

Description. Head and body laterally compressed. Dorsal profile rising evenly but not steeply from tip of snout to origin of dorsal fin, then sloping gently ventrally

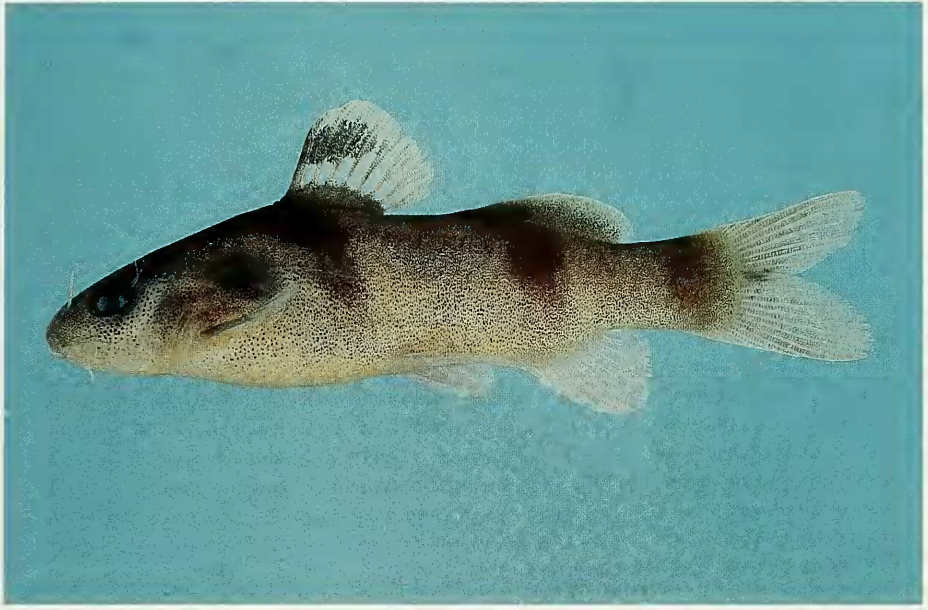


FIG. 6

Batasio tigrinus, paratype, CMK 14431, 52.8 mm SL (photograph by M. Kottelat).



FIG. 7

Batasio tengana, UMMZ 209009, 54.8 mm SL, left side, reversed (photograph by Tan Heok Hui).

from there to end of caudal peduncle. Ventral profile horizontal to origin of anal, then sloping dorsally to end of caudal peduncle. In % SL ($n = 12$): head length 24.2–26.7, head width 13.9–15.5, head depth 16.3–19.5, predorsal distance 36.2–38.9, preanal length 65.6–69.7, prepelvic length 47.1–50.9, prepectoral length 21.3–24.1, body depth at anus 18.4–20.8, length of caudal peduncle 16.1–19.0, depth of caudal peduncle 10.1–11.8, pectoral-fin length 16.9–19.1, pectoral-spine length 10.3–12.9, length of dorsal-fin base 14.2–16.7, dorsal-spine length 9.4–12.5, pelvic-fin length 13.2–15.3, length of anal-fin base 13.3–16.1, caudal-fin length 20.0–26.5, length of adipose-fin base 23.9–26.7, dorsal to adipose distance 7.3–9.2; in % HL: snout length 31.9–36.9, interorbital distance 29.3–31.9, eye diameter 20.3–24.8, nasal barbel length 20.0–29.8, maxillary barbel length 42.6–58.9, inner mandibular barbel length 13.3–16.7, outer mandibular barbel length 20.0–28.2. Branchiostegal rays 6 (10). Gill rakers 3+5 (1) or 3+6 (1). Vertebrae 18+17=35 (1), 18+18=36 (4) or 18+19=37 (9).

Fin ray counts: dorsal I,7 (10), pectoral I,8 (8) or I,8,i (2), pelvic i,5 (10), anal iv,9 (7), or v,8 (3), caudal 8/9 (10). Dorsal origin nearer tip of snout than caudal flexure. Pectoral spine stout, with 6 (1), 7 (5), 8 (3) or 10 (1) large serrae on posterior edge. Anal origin slightly posterior to adipose origin. Depressed dorsal not reaching adipose fin. Caudal fin forked.

Colour. In 70% ethanol: body and head brownish-grey with four vertical dark brown bars: one on head passing through eye, second running obliquely anterior to dorsal fin, third at anterior third of adipose fin and last on posterior extremity of caudal peduncle. Dorsal fin hyaline, with a subdistal, horizontal dark brown elliptical mark on anterior half. Other fins with dusky rays and hyaline membranes.

In life, body and head yellowish grey to dark grey, with patterning from blackish to black. Oblique bar from dorsal origin followed by an adjacent, pale yellowish bar more or less of same width.

Distribution. *Batasio tigrinus* is presently known only from the Mae Nam Khwae Noi basin (part of the Mae Khlong basin) in western Thailand (Fig. 2).

Etymology. From the Latin *tigrinus*, meaning of tigers, in reference to the striped coloration of this species. An adjective.

DISCUSSION

In the only taxonomic study of *Batasio* to date, Hora & Law (1941) recognised *B. tengana* as the only valid species with a colour pattern of dark vertical stripes or blotches, invoking great intraspecific differences in the coloration and in the length and position of the adipose fin to explain the variation they observed among their samples. In fish taxonomy papers of that time, decisions often had to be based on a few samples and/or very few specimens, often (by present and our personal standards) poorly preserved as a result of the logistical problems and difficult technical conditions of field work at that time. Re-examination of many cases of such 'highly variable' widely distributed species previously known from a few disparate individuals has shown that, in fact, many are aggregates of distinct, often not even closely related, species (e.g. Ng, 1999a; 1999b; Kottelat & Ng, 1999). Hora & Law had access to only 18 specimens for their study; 10 from Bengal, 4 from Assam, 1

from Mergui, 1 from Tenasserim, and 2 from Perak, that is, 4 specimens from the area discussed here. Our examination of large series of *B. havmolleri* (85 specimens, up to 29 in a single series [MHNG 2158.48]), including observation of a large series of live, captive bred individuals (Kottelat & Wirtz, 1983) shows that the adult coloration, the length of the snout, the interorbital distance, the eye diameter, and the length and position of the adipose fin do not exhibit much variation within populations and species, and can be reliably used as diagnostic characters. Considering the confusion surrounding the validity of the nominal species of *Batasio*, we feel that it is necessary to discuss these nominal species in some detail here. This especially concerns the nominal species with a colour pattern of dark vertical stripes or blotches and currently considered synonyms of *B. tengana* (i.e. *B. affinis*, *B. fluviatilis*, *B. dayi*, *B. merianiensis*, *B. havmolleri*, and *B. stigmaturus*).

The original description of *B. tengana* gives the colour as “diaphanous, with a silver coloured membrane investing the viscera and spine, and with a gloss of gold at the sides. On the back are many black dots, which are collected into a spot above each pectoral fin and also on the crown of the head. The fins of the back and tail are also dotted, so that the edge of the last is black, and several spots are formed on the first” (Hamilton, 1822: 176). The type locality of *B. tengana* is often given as the Brahmaputra River (e.g. see Eschmeyer, 1998), following the original description, but Hora (1949) narrowed it down to “Gualpara” (=Goalpara in Assam state, Northeast India) based on original notes made by Hamilton. Although we have been unable to obtain topotypic material of *B. tengana*, we examined a specimen of *B. tengana* collected from the Brahmaputra River drainage (UMMZ 209009, 54.8 mm SL; Fig. 7) having a colour pattern that seems to agree with the original description and the accompanying figure (Hamilton, 1822: pl. 39 fig. 58), i.e. a species of *Batasio* with a relatively slender body and a dark vertical bar on the dorsal half of the body in front of the dorsal fin terminating in a spot below the dorsal fin. This spot does not exactly correspond to the position of the spot in Hamilton’s drawing which is, as he wrote, above the pectoral fin; in fact, the spot which he described apparently corresponds to the upper half of the air bladder which often appears as a dark area (see Figs. 1, 3-7). This single *B. tengana* specimen differs from all congeners in having more closely-set eyes (interorbital distance 22.2 % HL vs. 25.9–43.0). The colour pattern of *B. tengana* is also unique among species with vertical markings (*B. dayi*, *B. affinis*, *B. havmolleri*, *B. merianiensis*, *B. tengana*, and *B. tigrinus*) and only *B. dayi* (here considered a valid species, from the Salween basin) has a similar pattern. In both species, only the dark brown vertical predorsal bar is present (vs. predorsal bar and either spots or vertical bars present posteriorly in *B. affinis*, *B. havmolleri*, *B. merianiensis* and *B. tigrinus*). However, the predorsal bar in *B. dayi* does not terminate in an elliptical spot on the humeral region, as is the case in *B. tengana*. Furthermore, *B. dayi* differs from *B. tengana* and all other species with vertical markings (*B. affinis*, *B. havmolleri*, *B. merianiensis* and *B. tigrinus*) in having a longer snout (41.0–44.6 % HL vs. 31.9–41.5) and distal four-fifths (vs. one-third to half) of the dorsal fin dark brown. It further differs from the single available *B. tengana* in having a stouter body (body depth at anus 19.2–20.5 % SL vs. 16.4).

Batasio affinis was described from the "Tenasserim Provinces" (see above) in southern Myanmar (Burma). The species was described as having a distinct predorsal vertical bar, and "posterior to this first band are obscure traces of three or four others, the last at the base of the tail" (Blyth, 1860). We have examined a photograph of a specimen from the Tenasserim River basin (see Material examined) and which we identify as *B. affinis*. The colour pattern of this specimen is very similar to that of adult *B. havmolleri*, except that the dark brown mark on the dorsal fin is larger in *B. affinis* (covering most of the distal half of the fin, except for a hyaline distal margin vs. the distal one-third [in most specimens, this mark is less extensive than on the one in Figure 4]). This photograph shows the larger eye (ca. 26 % HL) and shorter snout (ca. 37 % HL) which we consider characteristic of *B. affinis* (see below), although the colour pattern differs somewhat from that of the original description, which may possibly be explained by ontogenetic changes in the colour pattern [in some specimens of *B. havmolleri* and, we hypothesize in *B. affinis* as well, the pale bands between the darker marks on the body and caudal peduncle appear darker medially; this probably explains the "three or four" other bars mentioned by Blyth]; the holotype does not retain any colour pattern. Therefore, we do not consider *B. affinis* and *B. havmolleri* conspecific. The two species also differ in the single examined *B. affinis* having a longer dorsal spine (ca. 14 % SL on the photograph; 14.0 % SL vs. 10.7–12.4), shorter snout (36.0 % HL vs. 38.3–41.5), larger eyes (24.4 % HL vs. 18.2–23.5) set further apart (31.7 % HL vs. 25.9–28.6), and a more anterior pelvic-fin origin (in front of base of last dorsal-fin ray vs. below or slightly behind).

Batasio merianiensis (from Assam in Northeast India) also has a colour pattern similar to those of *B. affinis* and *B. havmolleri*. We have examined the holotype, but no additional material was available. We consider it to be a distinct species differentiated from both *B. affinis* and *B. havmolleri* in having a shorter adipose-fin base (22.2 % SL vs. 34.3 in *B. affinis* and 30.0–33.3 in *B. havmolleri*). It further differs from *B. havmolleri* in having larger eyes (25.9 % HL vs. 18.2–23.5).

Batasio tigrinus can be differentiated from *B. affinis*, *B. dayi* and *B. havmolleri* in having an adult colour pattern of four dark brown vertical bars (only *B. havmolleri* specimens of less than 40 mm SL have such a colour pattern). It can be further differentiated from *B. havmolleri* in having a shorter pectoral spine (10.3–12.9 % SL vs. 13.3–15.3), adipose-fin base (23.9–26.7 % SL vs. 30.0–33.3), and snout (31.9–36.9 % HL vs. 36.9–41.5), more widely-set eyes (interorbital distance 29.3–31.9 % HL vs. 23.2–26.3), and fewer vertebrae (35–37 vs. 38–40).

Both *B. batasio* and *B. travancoria* can be differentiated from all their congeners in having a combination of a slender body (body depth at anus 14.7–17.2 % SL vs. 18.0–22.5) and a colour pattern consisting of a dark brown midlateral stripe. The midlateral stripe in *B. batasio* is expanded to form an elliptical dark brown spot immediately below the dorsal-fin base (absent in *B. travancoria*) while that of *B. travancoria* is expanded at the posterior edge of the caudal peduncle to form a triangular dark brown mark (absent in *B. batasio*). Furthermore, *B. batasio* has a greyish brown coloured body with a mottled pattern of faint brown patches while *B. travancoria* has a uniformly-coloured dark brown body. *Batasio batasio* further

differs from its congeners in having a long snout (43.9–46.2 % HL vs. 31.9–41.5) and *B. travancoria* further differs from its congeners in having a flatter head (head depth 14.8–15.5 % SL vs. 16.3–21.2).

Batasio pakistanicus was described from the Indus River basin by Mirza & Jan (1989). The original description is rather uninformative, and we are unable to verify the accuracy of the figure provided. Based on the original description and figure, we are not able to determine if *B. pakistanicus* belongs to *Batasio* or *Rama*. If we consider *B. pakistanicus* to belong in the former genus, the colour pattern (a black humeral spot with a dark streak on the dorsum) clearly differentiates it from all other congeners (including the Indochinese species discussed here).

COMPARATIVE MATERIAL

Batasio batasio: ZRC 40570, 10 ex., 53.4–67.8 mm SL; India: Assam, Dibrugarh.

Batasio merianiensis: ZSI F 7781/1, 1 ex., holotype, 65.7 mm SL; India: NE Assam, Meriani junction.

Batasio tengana: UMMZ 209009, 1 ex., 54.8 mm SL; Bangladesh: Chittagong, Koilla Khal (creek), 6 miles E of Feni–Chittagong highway on road to Ramgarh (22°55'N 91°36'E).

Batasio travancoria: ZSI 13449/1, 1 ex., holotype, 73.6 mm SL; India: Travancore, from the foot of the largest falls of Peruntenaruri, a tributary of the Pamba River at Edakadathy. – ZSI 13452/1, 1 ex., 58.1 mm SL; India: Travancore, Palode, Chittar River. – CMK 10028, 5 ex., 85.1–101.0 mm SL; India: Kerala, Panamkulam, ca. 26 km from Chalakudy on Chalakudy–Valparai road.

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